



SEBRA®

service manual

108755-US

Model 1040
Digital Blood Shaker

HAEMONETICS®
THE Blood Management Company





Haemonetics® SEBRA®
Model 1040
Digital Blood Shaker
- Service Manual -



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CONSUMER INFORMATION

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This manual is intended as a guide to provide the operator with necessary instructions on the proper use and maintenance of certain Haemonetics Corporation products. This manual should be used in conjunction with instruction and training supplied by qualified Haemonetics personnel. Any failure to following the instructions as described could result in impaired product function, injury to the operator or others, or void applicable product warranties. Haemonetics accepts no responsibility for liability resulting from improper use or maintenance of its products.

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Chapter 1

Introduction

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PRELIMINARY INFORMATION

Document scope

This manual is a guide for the general repair of the Haemonetics® SEBRA® Model 1040 Digital Blood Shaker (hereinafter referred to as "the Shaker").

Intended audience

This manual is intended for use by Level Two repair technicians.



Note: Level Two repair is defined as major component and subassembly exchange and replacement. Technicians providing Level Two repair may have received individual training at Haemonetics, and only will be performing basic repair. Level Two technicians should have basic technical skills and a thorough understanding of Haemonetics products, procedures and safety requirements needed for changing subassemblies, etc.

This manual is not designed for individual component troubleshooting and repair, defined as Level Three repair. Level Three repair is only to be performed by repair technicians who have extensive electronics background, have received individual instruction and training from Haemonetics, and have the necessary equipment needed to perform this level of repair.

SYMBOLS

Symbols found in this document

The terms *Note*, *Caution* and *Warning* are used in this manual with the following symbols to notify the operator of important and/or critical information.



Note: provides useful information regarding a procedure or operating technique when using Haemonetics material.



Caution: advises the operator against initiating an action or creating a situation that could result in damage to equipment, or impair the quality of the blood products; personal injury is unlikely.



Warning: advises the operator against initiating an action or creating a situation that could result in serious personal injury to the donor, the operator, or the blood product recipient.

Symbols found on the device

The following symbols may be found on the device or device packaging.



Caution, risk of electric shock



Caution (refer to accompanying documents)



Protective Earth (P.E.)



Fuse



On



Off



Serial number



Catalog number



Manufacturer

REPLACEMENT PARTS ORDERING AND TOOLS REQUIRED

- Krazy Glue® (or equivalent cyanoacrylate glue)
- Dow Corning® 55 lubricant by Dow Corning P/N 470030-080
- Digital multimeter
- ABS Cement/Multipurpose ABC®, PVC, CPVC cement
- Box knife blade
- Basic shop tools (wrenches, pliers, screwdrivers, etc)
- Standard electronic assembly tools
- Oscilloscope
- Snap ring pliers
- Automatic center punch
- Black permanent ink pen (Sharpie® or equivalent)
- Loctite® 271, Red
- Loctite 242, Blue
- Loctite 3412, two part structural adhesive
- Calipers (for solenoid length measurement)
- Flashlight
- Wiring extender harness (P/N 10405012-00)
- Hand tools (long shank #2 phillips screwdriver, etc.)
- Spring tension wrench (P/N 10400026)
- 2 x 4 x 5.50 in. wooden block, padded on each end with 1 x 2 x 5 in. foam pads (for shroud bowing)

Replacement parts ordering

To order replacement parts, contact Haemonetics® Customer Care Center.

GLOSSARY

Suitable work surface	Flat, non-conducting bench-top or work surface
PCB	Printed Circuit Board
PCBA	Printed Circuit Board Assembly
ESD	Electrostatic Discharge
HB	Head Board
BB	Body Board
CL	Clock
CPM	Cycles per minute
GND	Ground
LED	Light Emitting Diode
CW	Clockwise
CCW	Counter-Clockwise



Caution: *Be careful not to burn PCBA's and surrounding wires when using soldering iron. Before applying AC Power, AC GND must be hooked up to the chassis assembly. Always use proper electrostatic discharge sensitivity (ESD) handling techniques.*

Chapter 2

Product Description

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PRODUCT OVERVIEW

The Haemonetics® SEBRA® Model 1040 Digital Blood Shaker (the Shaker) is a portable instrument used during the collection of whole blood. It continuously mixes the collected blood with the anticoagulant, and automatically clamps the blood bag tubing to stop blood flow when the desired collection weight or volume is obtained.

The Shaker has an LED display showing the amount of blood collected at the time of observation, as well as visual blood flow rate indicators which show the adequacy of blood flow. The completion of the blood collection cycle is signaled by both audible and visual indicators. All data pertinent to the last blood collection are stored in the Shaker's memory, permitting the operator to retrieve and review it as needed. Blood collection parameters may be easily modified. The Shaker has partial bag collection capability and although it operates on weight, it can convert to volume to display the collection by milliliters or by grams. To safeguard against unauthorized or accidental changing of collection parameters, a password is required for entry into the setup section.

THEORY OF OPERATION

The Shaker is a microprocessor-controlled instrument. All the functions needed to collect blood, such as mixing, stopping the flow, displaying and indicating the flow, etc., are managed by programs that are permanently written into the microchips ("firmware"). Parameter settings for a particular collection, such as bag type, collection volume, etc., are stored in the Shaker's memory and are used by the firmware when the collection is performed.



Note: If the parameters are not changed, the firmware will always use the last parameters entered.

The blood bag rests upon the Shaker bag tray portion of the shroud assembly in an orientation that allows a gentle end-to-end agitation of the blood. The bag tilts over an approximate angle of 32° at an oscillation of approximately 38 cycles per minute.

The collection process is monitored continuously to ensure the required weight or volume is obtained. The blood weight is compared to the desired collection weight. If the weight is equal to the desired collection weight, the Shaker clamps the bag tubing (which stops the blood flow), illuminates a continuous red indicator light, and sounds an audible alert. The Shaker continues to agitate the blood until the operator terminates the process.

The Shaker also uses the weight measurement for another task. As the blood is collected, the Shaker measures the weight once every mixing cycle. The Shaker compares the weight at one cycle to that of the previous cycle, and the rate of collection is automatically calculated. The rate of collection is compared to internally stored parameters; and if it falls below the minimum rate, a red indicator light flashes to tell the operator that an inadequate or no flow condition exists.

COMPONENT IDENTIFICATION

Figure 2-1, Shaker Components, indicates each part of the Model 1040.

1. Keypad
2. Clamp
3. Bag Tray
4. Bag Pegs
5. Shroud Assembly
6. Power Cord

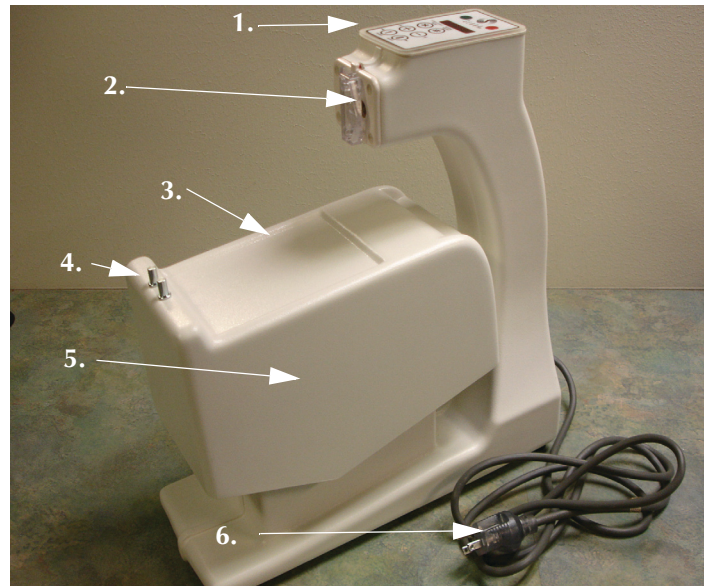


Figure 2-1, Shaker Components

1. LED Display
2. Satellite Bag Peg
3. Base
4. Serial Plate



Figure 2-2, Digital Blood Shaker - Power Detail

COMMUNICATING WITH THE SHAKER

Communication with the Shaker is accomplished by means of a keypad for input and an LED display for output (see Figure 2-3, Shaker Keypad for Input/Output).

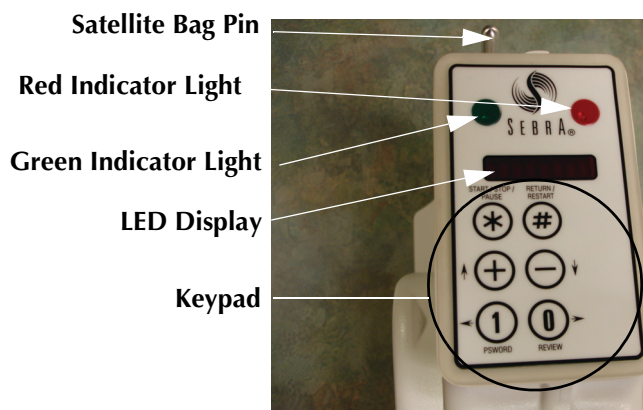


Figure 2-3, Shaker Keypad for Input/Output

The following input/output conventions apply:

<any key>: When angle brackets around a keypad character appear in these instructions, it indicates the exact key is to be pressed by the operator.

"output": In this service manual, non-italicized words in quotes are the literal words that are shown on the Shaker display.

"*output*": italicized words in quotes are words or numbers that vary on the Shaker display. Example: in this manual, the display for the date is expressed "*DDMMYY*" while the Shaker display will show actual data such as "01**JAN**02".

flashing: A flashing character is indicated by bold type. If a character on the display is flashing, its value may be increased or decreased by the operator, or the operator may toggle (switch back and forth) between two possible choices. Example: in the Shaker display "01**JAN**02" the bold "JAN" will be flashing.

START / STOP / PAUSE <*>: Pressing the start/stop <*> causes progression to the next logical step in any one of the several Shaker functions available to the operator:

- From the "READY" mode, pressing <*> starts the blood collection function.
- During collection, pressing <*> places the Shaker in a Pause mode.



Warning: While in the pause mode, do not press <*> a second time prior to pressing <#> or the collection will terminate.

- Upon collection completion, pressing <*> will terminate the collection process.

RESTART / RETURN <#>: Pressing restart/return <#> causes the Shaker to perform one of the following functions:

- Return to "READY" mode from the setup mode.
- Resume blood collections when in pause mode.
- Restart calibration after zero weight measurement.

↑ <+>: The ↑ <+> key is used for the following functions:

- To increase data, such as minutes, hours, etc., or for toggling.
- As a password character.
- As a means of jumping ahead to the clock/calendar initialization of the set-up function.

↓ <->: The ↓ <-> is used for the following functions:

- To decrease data, such as minutes, hours, etc., or for toggling.
- As a password character.
- As a means of bypassing the calibration portion of the setup function to proceed directly to the full or partial collection option.
- To clamp and unclamp the blood bag tubing from the "READY" mode.

psword, ← <1>: The psword, ← <1> key is used for the following functions:

- To enter the password screen from the "ready" mode for Shaker setup (calibration, configuration, password change, and clock/calendar initializing).
- To move the flashing cursor on the LED display to the left. (←).



Warning: Access to the setup function should be limited to authorized personnel.

review, → <0>: The review, →, <0> key is used for the following functions:

- To review data related to the last blood collection, the last calibration, and the current date and time from the "READY" mode.
- To move the flashing cursor on the LED display to the right (→).



The Shaker keystrokes are summarized in Chapter 15, Keystroke Quick Reference on page 15-2.

Chapter 3

Inspection Procedures

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INITIAL EVALUATION

Utilize the following procedures to diagnose the problem(s) affecting the Shaker. The initial source of information is normally the customer complaint. Other sources may be engineering records, previous repair records, and visual and audible observations.

VISUAL INSPECTION

1. Verify that the Shaker is unplugged from any power source (e.g., wall outlet).
2. Remove the base plate of the Shaker (see Chapter 4, Base Plate Removal on page 4-2).
3. Visually inspect the body board and power supply for burned or missing components or other potential mechanical obstructions or electrical hazards.
4. Inspect the base of the Shaker for obvious cracks extending from the base plate screw holes up the sides of the Shaker. Inspect the seam joining the two halves of the Shaker to determine that it is secure. Inspect under the shroud at the link assembly to verify that there are no obstructions to the crank "M" assembly, link assembly or shroud assembly. Also inspect for foreign objects under the shroud (e.g., packing materials, etc.).
5. Inspect the power cord for cut or broken insulation. Remove any tape or labels except Underwriter's Laboratory or Canadian Standards Association (CSA) approval labels, as they may be concealing a cut in the insulation or other defect.
6. Return Shaker to its upright position on a suitable work surface. If the Shaker has passed all of the preceding inspections, proceed to the repair section of this manual and perform the necessary repairs. Upon completion of repairs, repeat all inspection steps.

INSPECTION WITH POWER APPLIED



Note: If the motor fails to run in the following procedure, disconnect the Shaker from its AC power source, discontinue this procedure and repeat the visual inspection above seeking obstructions. If no obstructions are found, proceed to "Troubleshooting" on page 3-7 and reference the failure "Motor fails to operate when power is applied to the Shaker."

1. Plug power cord into appropriate power outlet (110-120 VAC 60 Hz or 220-240 VAC 50-60 Hz) and observe the operation of the Shaker. The LED display will show a pixel test as it initializes, then it will display <READY>.
2. Press the <*> button. The shroud should oscillate in a smooth end-to-end tilting motion, accompanied by the sound of the motor running. The flow rate indicator light should rapidly blink red, because there is no blood flow.
3. With the Shaker running, *gently* but firmly press down on the front of the shroud. The audible alert (one long beep) should sound, the red flow rate indicator on top of the Shaker should illuminate and the tube clamp should snap closed (the tube clamp should be visible between the tube holder and the clamp body). If any of the above indications are not observed, place the power switch in the "off" position, remove AC power and proceed to "Troubleshooting" on page 3-7 of this manual.

CALIBRATION



Warning: Calibration must be performed according to the following approved procedure using a Haemonetics® SEBRA® certified calibration weight. If the Shaker is calibrated using any other weight or procedure, the accuracy of the blood collection volume cannot be assured.

The Shaker should be calibrated after any repairs have been performed.

1. From the "Ready" mode, press <1>. The display will read "pw".
2. Enter the current password, then press <*>. The display will now read "set up".
3. Press <*>. The display will now read "Calibrat".



Note: If you accidentally get into the manual mode, the display will read "manual". Immediately press <#> to return to "ready".

4. Press <+>. The display will now read "zero wt".



Note: At this point, be sure there is nothing on, or resting against, the Shaker shroud assembly.

5. Press <*>. The shroud assembly will start oscillating. The display will first read "weighing" for a short time, then the display will show a "zero value" number. This number represents a minimum weight value allowed within the calibration parameters. The shroud assembly will automatically stop oscillating and the "zero value" number will be replaced by the words "place wt".



Note: If for some reason it is necessary to start the calibration again at this point, press <#> and the display will read "Calibrat". Go back to step 4 to try the calibration again. If the display reads "FAILURE", be sure the Shaker is level and that nothing is resting on or against the shroud assembly. Press any key on the keypad to return to "Calibrat", and then go back to step 4 to try again.

6. Place a Model 1024 (585 gram) certified calibration weight on the bag tray, secured to the two bag pegs, with the hinged counterweight pointed toward the pegs, as shown in Figure 3-1, Calibration Weight Placement.

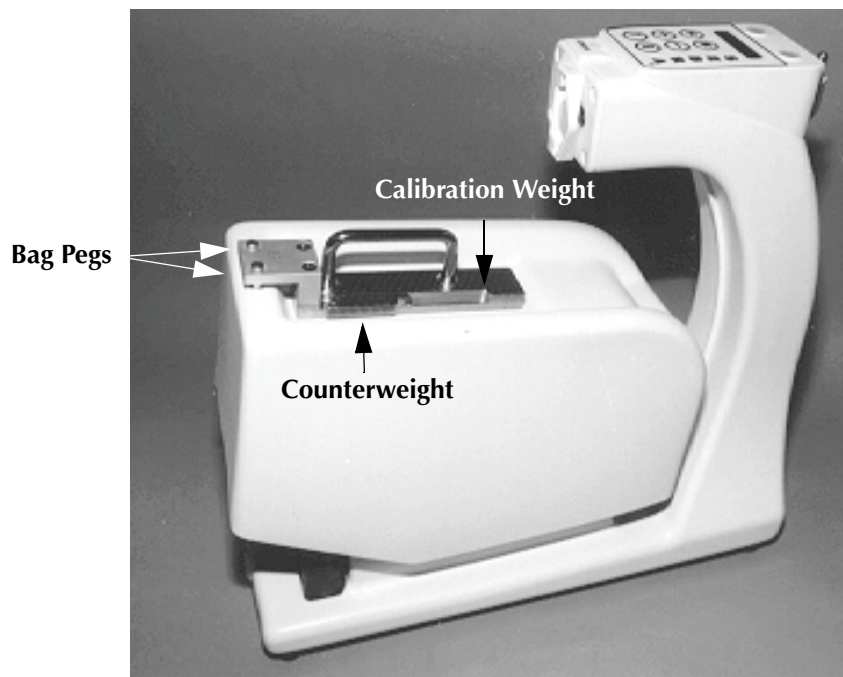


Figure 3-1, Calibration Weight Placement

7. Press <*>. The shroud assembly will start oscillating, the display will first read "weighing" for a short time, then the display will show a "calvalue" number. This number represents the maximum weight value allowed within the linear range. The shroud assembly will automatically stop oscillating, and the "calvalue" number will be replaced by the word "Calibrat."
8. If the display reads "FAILURE", record the number listed before the word failure, reference "Troubleshooting" on page 3-7.
9. Press <#> to return to "ready" mode and remove the certified calibration weight from the bag tray.



Note: The calibration weight has been calibrated at Haemonetics. Haemonetics recommends verification of the weight annually using a calibrated digital scale that can be traced to the National Institute of Standards and Technology (N.I.S.T.). A log of verification should be kept. The weight should be 585 grams $\pm$ 0.4 grams. If the weight is outside this tolerance, return it to Haemonetics for calibration.



Warning: Do not apply any labels to the calibration weight; it will alter the total weight.

TROUBLESHOOTING

Table 3-1, General Troubleshooting Guide

Failure	Diagnosis	Action
Overweight blood collection.	Shaker not clamping or not completely clamping (i.e., solenoid throw requires adjusting).	See "Tube clamp not functioning" in this table.
	Shaker not calibrated.	Calibrate Shaker. See Calibration section above.
	Foreign object on shroud.	Remove object.
Underweight blood collection.	Shaker not calibrated.	Calibrate Shaker. See Calibration section above.
	Foreign object on shroud.	Remove object.
Shaker will not calibrate.	Faulty strain gauge.	See Chapter 5, Strain Gauge Inspection and Replacement on page 5-2.
	Weight sensing assembly requires adjustment.	Adjust R3 and R7 on body board.
Shroud "clunks," moves with a jarring motion or fails to move.	Something obstructing the shroud or link.	Verify power cord is not blocking shroud on its back stroke. Inspect area around and under shroud for obstructing objects and remove them (with the Shaker unplugged), if necessary.
	Shroud boss broken loose from the inside of the shroud.	Replace shroud. See Chapter 10, Shroud Assembly Installation on page 10-8.
	Shroud is rubbing base assembly or link assembly.	Bow shroud. See Chapter 10, Bowing the Shroud on page 10-7.
	Set screws on crank assembly are loose.	Replace screws.
	Link M, Link Y or Shaft M damaged or loose.	See Chapter 6, Link Assembly Inspection on page 6-2.
Shaker extremely noisy (grinding or rubbing sound).	The motor and Link Y connections have become worn or out of alignment.	See Chapter 6, Link Assembly Inspection on page 6-2.
Tube clamp fails to engage at collection completion.	Insufficient power to solenoid.	See Chapter 7, Tube Clamp/Solenoid Inspection, Replacement and Adjustment on page 7-2.

Table 3-1, General Troubleshooting Guide

	Tube holder cracked.	Replace tube holder. See Chapter 7, Tube Clamp Inspection and Adjustment on page 7-5.
	Clamp body cracked around screw mounting pillars or clamp body mounting screws.	Replace clamp body. See Chapter 7, Tube Clamp Inspection and Adjustment on page 7-5.
	Mounting screws loose.	Tighten screws.
	Solenoid requires adjusting.	Adjust solenoid. See Chapter 7, Tube Clamp/Solenoid Inspection, Replacement and Adjustment on page 7-2.
Broken, cracked or split base, neck or shroud. Shaker fails electrical safety check.	Cracks in the shroud; cracked, broken or missing shroud bosses. Loose or dirty ground connection.	Replace shroud or bosses. See Chapter 10, Shroud Assembly Installation on page 10-8. Verify that ground connections (power plug, motor and base plate) have good connections and are secure (reference Schematic Assembly Interconnect Diagrams).
	Loose crimp connector.	Check all attaching nuts for corrosion and tightness.
	Broken wire.	Inspect all ground wiring for cuts, breaks, and poor termination.
Motor fails to operate when the power is applied.	Power to motor failure.	Verify all wiring connections.
	Malfunction between control circuit board and motor.	Verify all wiring connections.
	Internal motor failure.	Replace motor. See Chapter 10, Motor Replacement on page 10-4.
Shaker does not initialize (does not read "READY").	Microprocessor malfunction.	Replace or reprogram microprocessor. See Chapter 9, Microprocessor Settings on page 9-8.
	Open wire or broken connection.	Check all wires and connections; repair as necessary.
	PCB assembly malfunction.	Replace PCB assembly. See Installing the PCB Chassis Assembly on page 8-2.
	Head board malfunction.	Replace head board. See Chapter 13, Head Board Replacement on page 13-5.

Table 3-1, General Troubleshooting Guide

	Ribbon cable requires replacement.	Replace ribbon cable. See Chapter 13, Cap Assembly Removal on page 13-3.
Audible alert fails to sound with power switch on and shroud depressed.	Audible alert failure.	See Chapter 12, Audible Alert Failure on page 12-2.
	Damaged or disconnected wires to audible alert.	Replace or repair wires.
	Other component failure.	Follow malfunction isolation section for suspected component.
Display or indicator lights do not illuminate.	LED burnt out.	Replace head board. See Chapter 13, Head Board Replacement on page 13-5
Keypad button does not activate properly.	Keypad malfunction.	Replace keypad. See Chapter 13, Keypad Replacement on page 13-6.
Display reads "gibberish" or unintelligible words.	Head board or body board malfunction.	Replace head board. See Chapter 13, Head Board Replacement on page 13-5 and Chapter 9, Body Board Replacement on page 9-2.

Chapter 4

Parts Access

BASE PLATE REMOVAL	4-2
SHROUD REMOVAL	4-3

BASE PLATE REMOVAL



Warning: Prior to initiating any repair, verify that the Shaker power cord has been unplugged from its source of power. Failure to do so may result in injury or death to personnel or damage to equipment.

1. Verify that the Shaker is unplugged and place the Shaker on an electrostatic discharge (ESD) protective mat and place an ESD protective wrist band on your wrist.



Caution: *This device contains sensitive electronic devices. Do not handle or store near strong electrostatic, electromagnetic, magnetic or radioactive fields. Use an electrostatic safe workstation and repair techniques.*

2. Lay the Shaker on its side, or place on its back in a servicing cradle or cardboard box with the bottom of the Shaker facing up.
3. Remove the 10 base-plate screws and retain for reinstallation. Partially remove the base plate from the bottom of the Shaker.
4. The hex nut and lock washer holding the base plate ground wire in place will now be exposed. Remove the nut, washer and ground wire screw. Remove the ring terminal and wire from the screw and reinstall the nut and lock washer on the screw through the base plate for safe keeping. Retain the base plate for reinstallation.

SHROUD REMOVAL



Note: Prior removal of the chassis plate assembly may aid this procedure.

1. Use a long phillips screwdriver to remove the two screws that secure the female knife edge to the shroud in the front. Loosen the two rear screw mounting screws from the mounting shaft. Detach shroud from base.

Chapter 5

Strain Gauge

STRAIN GAUGE INSPECTION AND REPLACEMENT	5-2
Strain gauge replacement	5-6
BODY BOARD STRAIN GAUGE AMP ADJUSTMENT PROCEDURE	5-7

STRAIN GAUGE INSPECTION AND REPLACEMENT



Caution: Always wear an ESD strap when working on the Shaker.

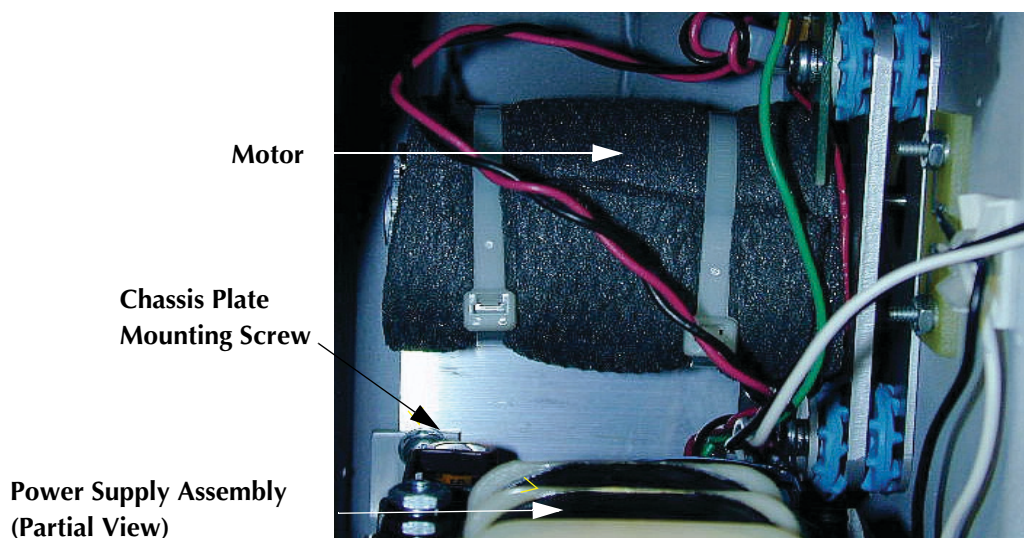


Figure 5-1, Body Board and Power Supply Assembly Removal

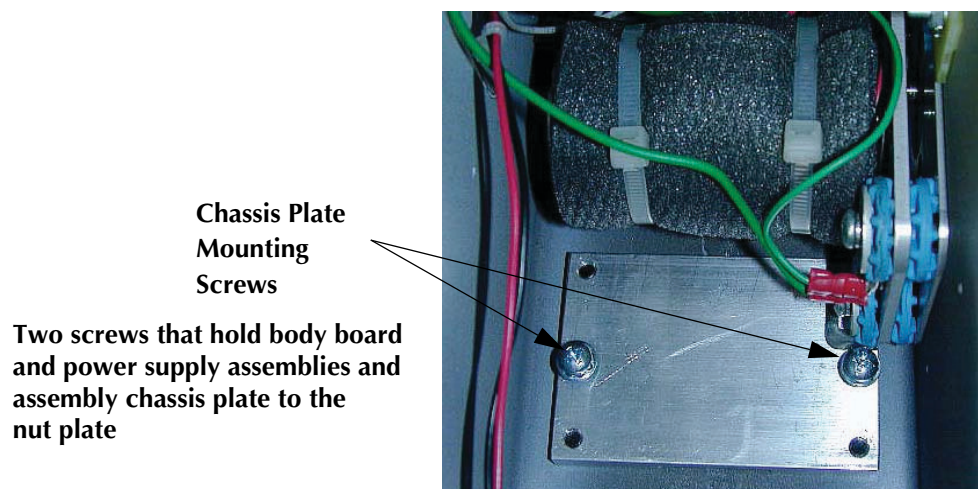


Figure 5-2, Nut Plate and Chassis Plate Mounting Screws

1. With the base plate and shroud removed from the Shaker, remove the two screws securing the chassis plate to the bracing bar.

2. Loosen the two screws that secure the chassis to the nut plate approximately three turns (a long phillips screwdriver is required). Use a flashlight to assist in locating the screws. The body board and power supply will be loose. Gently remove them from the Shaker.



Note: Reference Strain Gauge PCBA 10402511. Those PCBAs Revision F and earlier, Figure 5-3, have the adjustment potentiometer. Revision G, Figure 5-6, does not have this adjustment.

3. Unplug connectors P2, P3, and P7 from the body board and P3 from the power supply board. Remove the short ground cable. Set aside the body board and power supply.



Caution: Tie-up, insulate or otherwise control the ground wires and connectors when removing them from the base plate or chassis plate assembly to prevent unwanted contact with electrical/mechanical functions.

4. Using an extender wire harness (P/N 10405012-00), reconnect connectors P2, P3, and P7 on the body board and P3 on the power supply. Tape Link D to the Link Y to prevent Link D from binding against the base.

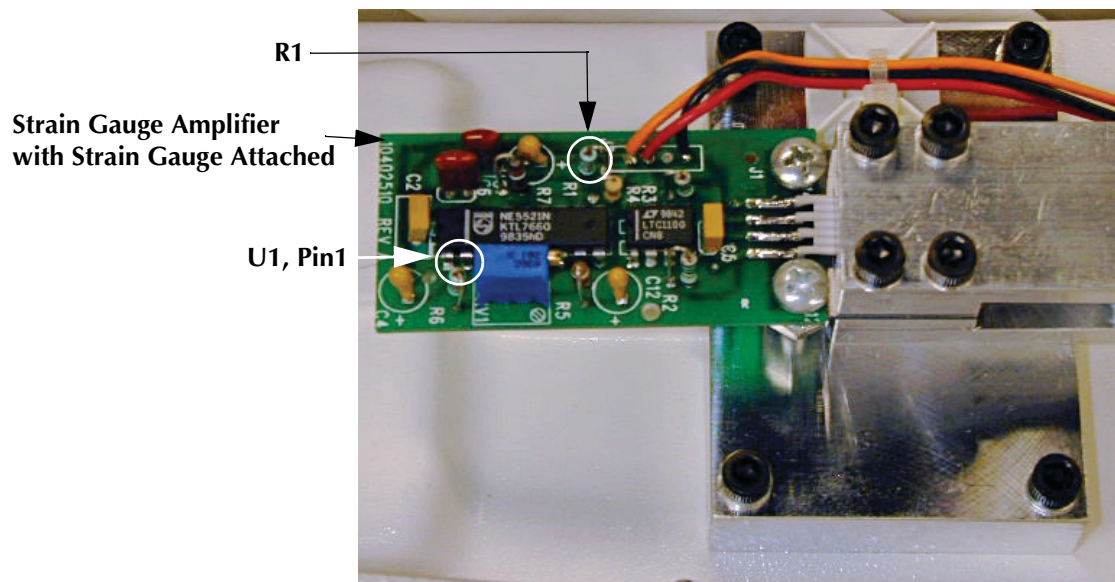


Figure 5-3, Weight Sensor Assembly



Note: For those 10402511 PCBAs at Revision G or higher, go to step 11.

5. Reference drawing 10402500. Remove weight sensor assembly from the base. Mount assembly on bench with a c-clamp.
6. With an oscilloscope, attach the probe to Pin 1 on U1 and ground the probe to R1 on the strain gauge PCBA. Plug in the Shaker.
7. Set the oscilloscope vertical input to AC mode and 1 volt per division centered on the display, horizontal input at 350 ms-14 ms to view output.



Warning: With the removal of the Body Board and Power Supply PCBA's from the base, AC and DC voltages are exposed. Use CAUTION when handling these assemblies.



Warning: Input Power fuse "F1" fuse holder, located on the power supply PCBA, is exposed when the Body Board and Power Supply PCBA's are removed from the base. Use CAUTION when handling this assembly.



Warning: Before applying AC power, connect AC ground from the input power receptacle to the chassis plate ground stud.

8. Start Shaker weighing routine (crank arm must be attached for one-bit encoder to sense rotation).
9. With no load on knife edge, oscilloscope should show a maximum of 200 mv (see Figure 5-4, Oscilloscope Reading). If the reading is higher, verify cage alignment and mounting screw torque and ensure strain gauge alignment freedom of movement. If problem still exists, contact Haemonetics for strain gage replacement options.

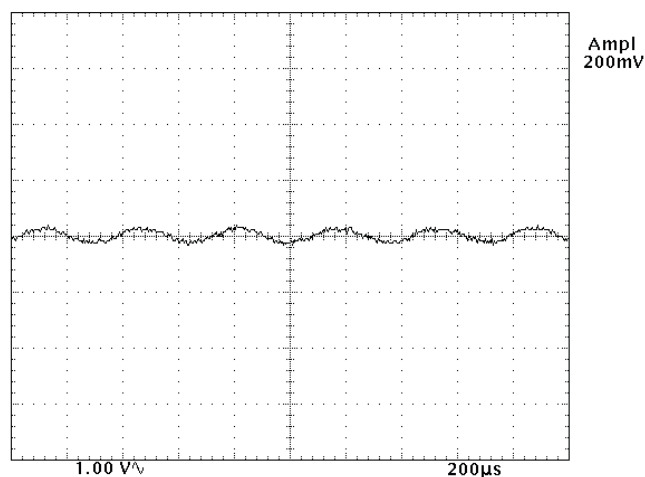


Figure 5-4, Oscilloscope Reading

10. Gently press down on knife edge. The oscilloscope should show a signal similar to the wave form in Figure 5-5, Oscilloscope Wave Form.

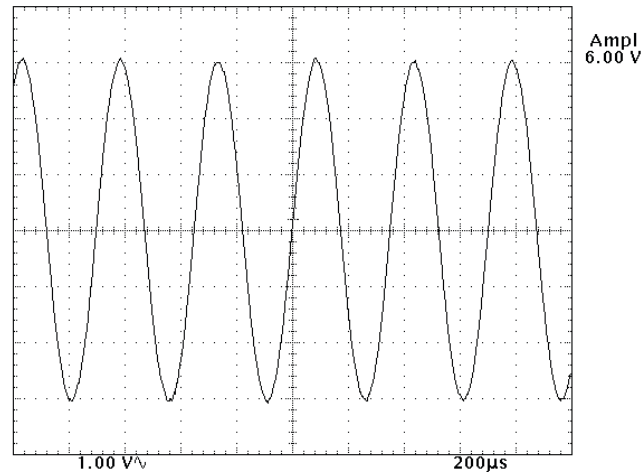


Figure 5-5, Oscilloscope Wave Form

11. Stop Shaker weighing routine from keypad. Remove power from Shaker. Detach adjusted assembly from fixture.

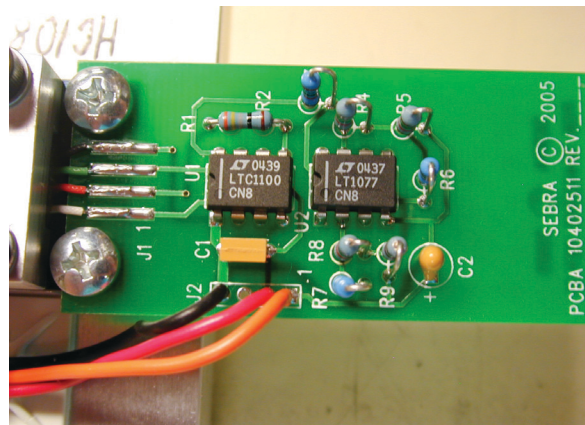


Figure 5-6, Weight Sensor Assembly-Current

12. For those PCBAs at Revision G or higher, after step 5 attach a DVM ground lead (black) to TP5 and the positive lead (red) to TP2 on the body board.
13. Apply power to the Shaker. Press the "*" on the keypad to start the Shaker.
14. With no weight on the knife edge of the strain gage assembly, the DVM should read between 4.40 and 5.00 VDC.
15. Hang the strain gage calibration weight (p/n 10401200-00) on the knife edge, the DVM should read between 6.10 and 7.10 VDC.
16. Remove the calibration weight, stop the Shaker and remove power. The weight sensor verification is now complete.

17. Disassemble bench set-up and reassemble Shaker.

Strain gauge replacement

1. If there is a problem that is associated with the strain gauge assembly, please contact Haemonetics® Customer Care Center for replacement, calibration options.

BODY BOARD STRAIN GAUGE AMP ADJUSTMENT PROCEDURE



Note: If the body board PCBA and/or the strain gauge was replaced, perform this procedure.

1. Reattach strain gauge assembly and shroud onto the Shaker.
2. Enter the password, press <0> twice. The display should read "manual."
3. Press the <+> button to initiate the Shaker rocking until the shroud is at its maximum angle up. Continue to press the <+> button. (This procedure can also be accomplished by manually moving the link "m" to its highest position).



Note: For those 10402511 PCBAs at Revision G or higher, go to step 11.

4. Adjust potentiometer R3 on the body board until the display indicates 55 ± 3 with no load on the shroud.
5. Place calibration weight on the shroud with flipper toward the bag pins.
6. Adjust R7 for 785 ± 5 reading.
7. Remove the calibration weight. Readjust R3 for 50 ± 3 .
8. Repeat steps 4 through 7 until within limits.
9. Press the <#> button twice. The display should read "READY."
10. Calibrate the Shaker (reference Chapter 3, Calibration on page 3-5). (End of Procedure PCBAs with Revision F or lower.)
11. For those 10402511 PCBAs at Revision G or higher, after step 3 connect junction of resistors 24 and 25 to TP5 on the body board with a jumper wire.
12. Adjust R3 until the display indicates 50 ± 3 with no load on the shroud.
13. Place calibration weight on shroud with counterweight towards the bag pegs.
14. Adjust R7 for 850 ± 5 reading.
15. Repeat steps 12 through 14 until within limits.
16. Press the <#> button twice. The display should read "ready".
17. Calibrate the Shaker (reference Chapter 3, Calibration on page 3-5).

Chapter 6

Link Assembly

LINK ASSEMBLY INSPECTION	6-2
LINK ASSEMBLY REMOVAL	6-3
LINK ASSEMBLY INSTALLATION	6-4
SPRING TENSION ADJUSTMENT	6-5

LINK ASSEMBLY INSPECTION



Warning: Protective gloves should be worn while performing the following steps and changed as often as necessary to prevent the transmission of biohazardous materials to repair personnel and the surrounding area.



Caution: Always wear an ESD strap when working on the Shaker.

1. Remove the shroud (see Chapter 4, Shroud Removal on page 4-3). Position the Shaker with the left side facing forward so the link is easily accessible.

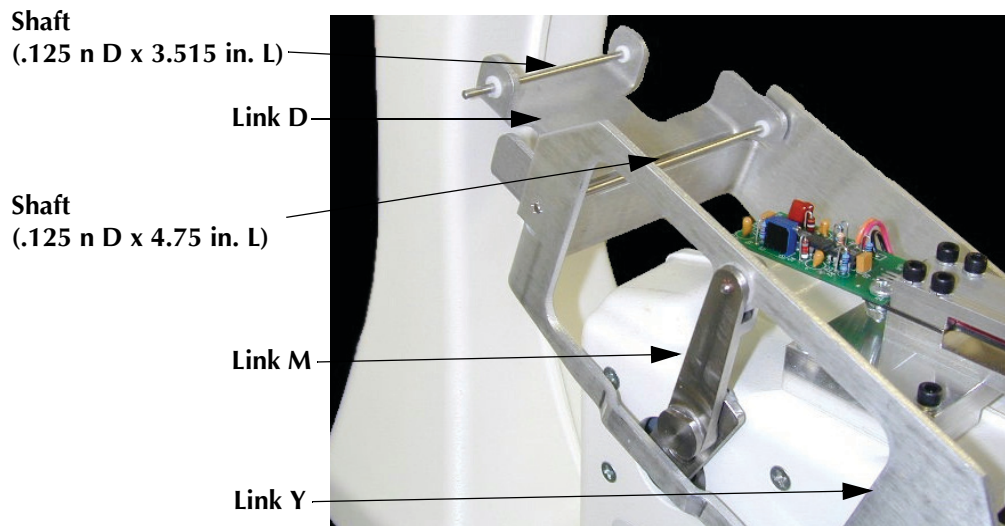


Figure 6-1, Link Assembly Inspection

2. Inspect the .125" D x 4.750" L shaft connecting the link D and link Y together for security and ease of movement. The shaft should fit tightly into the link Y at either end and should be peened in place at both ends. The link M and link Y should move freely without excessive play. The Teflon® bearings should be free of any damage and should be secure in their mounting holes. If damage or excessive play is noted, the entire assembly must be replaced.
3. Inspect the .125 D x 3.515 L in. shaft for damage and ease of movement. Examine the Teflon bearings for any damage and security in their mounting holes. The shaft should glide smoothly in and out of bearings without excessive side to side play. If the shaft or bearings are damaged or have excessive play, replace the parts necessary to return the Shaker to proper operating condition.

LINK ASSEMBLY REMOVAL



Warning: Tension on the link assembly may cause it to spring forward when released. Never place head or other body parts in front of link assembly during removal or injury could occur.

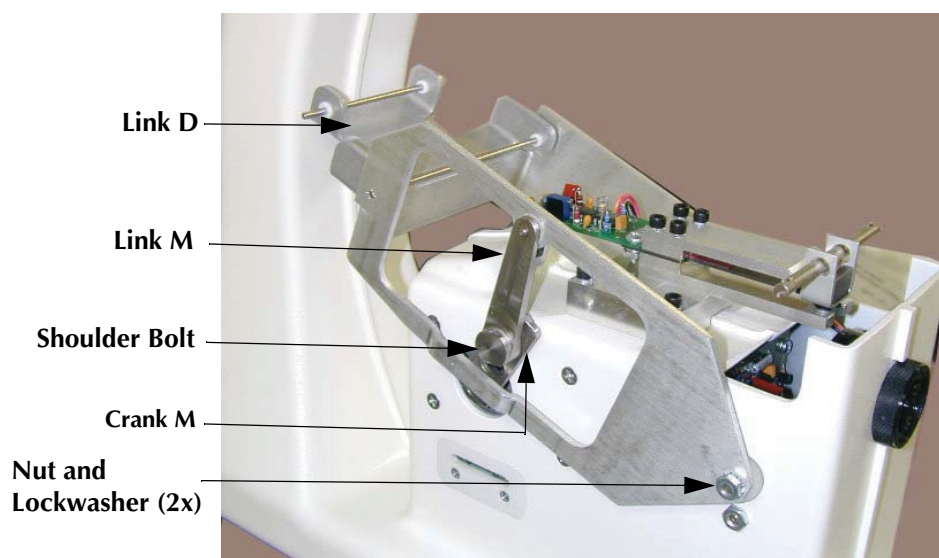


Figure 6-2, Link Assembly Removal and Installation

1. Remove the link assembly by detaching the shoulder bolt that secures the Link M to the Crank M.



Note: The threads on the shoulder bolt are left-handed.

2. Remove the two nuts and lock washers that secure the link assembly to the sides of the base. Remove the washers from the left side and retain for use.



Caution: Nylon washers must be replaced on the left side only.

3. Gently pull the link assembly away from the shaft and remove.

LINK ASSEMBLY INSTALLATION

1. With link to the front of Shaker, link D touching the workbench in front of Shaker, place the link assembly on the threaded ends of the spring guide shaft (see Figure 6-2, Link Assembly Removal and Installation). Replace the lock washer and nut on right end shaft and lock washer, washers and nut to the left of shaft. Do not tighten screws at this point.
2. Ensuring that the torsion spring is in the groove of the torsion bushing, rotate the shaft approximately $\frac{1}{2}$ turn toward the neck or until the 832 shoulder screw on shaft is facing neck of Shaker. Tighten nuts on shaft.
3. Grease shoulder bolt and apply red Loctite® 271 to threads. Rotate the link assembly back toward the neck until the shoulder bolt can be inserted through the link M and crank M.



Note: Threads on the shoulder bolt are left-handed threads.

4. Crank M and Link M should be close to parallel. If adjustment is needed, remove left lockwasher and nut and remove or add washers as necessary.

SPRING TENSION ADJUSTMENT



Note: The objective of this procedure is to achieve an equal sound/noise level on the up-stroke as well as the down-stroke.

1. Listen for an uneven noise level between strokes; if even, adjustment is adequate. Advance to step 7. If not even, advance to the next step.
2. Stop shroud movement and turn off Shaker.
3. Loosen the left and right nuts on the spring guide.

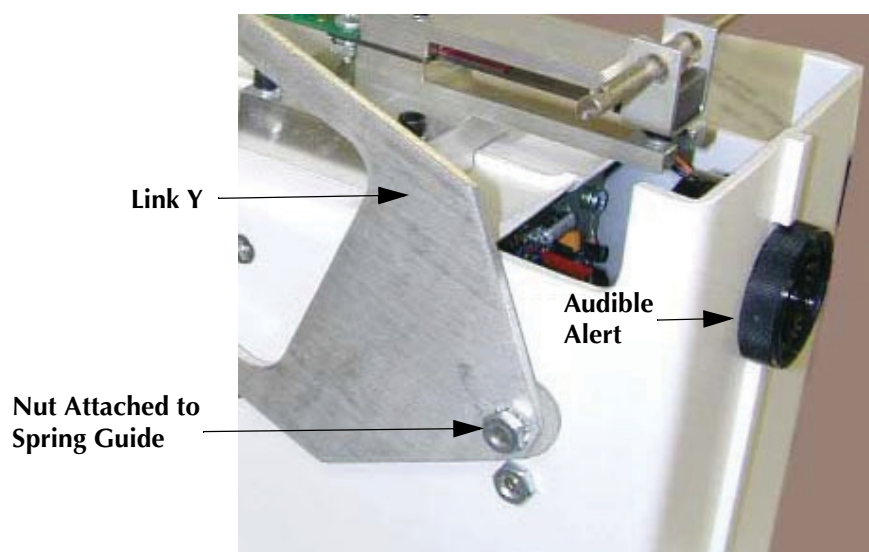


Figure 6-3, Nut Attached to Spring Guide (2x)

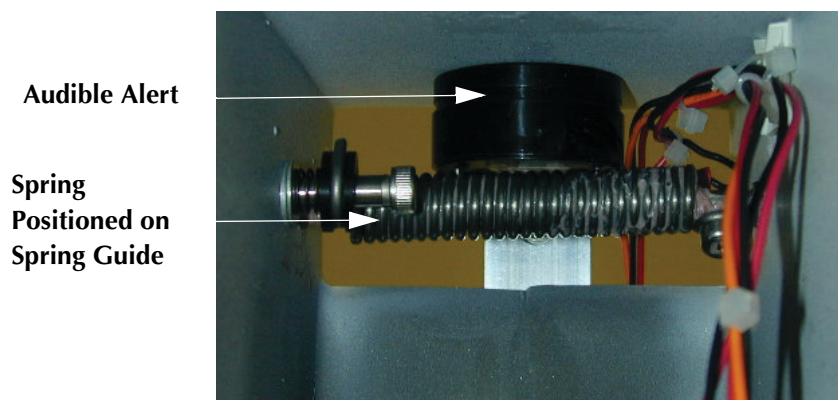


Figure 6-4, View of Spring Guide Looking at the Shaker from the Bottom

4. Using the Spring Tension Wrench (P/N 10400026) on the squared part of the right side of the spring guide, turn the spring guide accordingly to even the noise level.
5. Tighten both nuts and turn on the Shaker.
6. Repeat steps 2–4 until an optimum noise level has been achieved.
7. Press the <*> to cycle shroud assembly, count the cycles for one minute (CPM). The CPM should be 38cpm $\pm$ 5 cycles.



Note: If the power supply PCBA is P/N 10403200, RV1 can be adjusted to set the cpm. If p/n 10403600 is used, resistor R6 controls the cpm. Verify the body board R3, R7 calibration, reference Chapter 5, Body Board Strain Gauge Amp Adjustment Procedure on page 5-7.

Chapter 7

Tube Clamp Assembly

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TUBE CLAMP INSPECTION AND ADJUSTMENT	7-5

TUBE CLAMP/SOLENOID INSPECTION, REPLACEMENT AND ADJUSTMENT



Warning: The tube clamp should be treated as a biohazard area. Always wear rubber gloves when repairing.



Caution: Always wear an ESD strap when working on the Shaker.



Note: Shakers built after 1996 utilize self-tapping screws. Haemonetics recommends updating Solenoid Assembly mounting screws with the new variety.

1. With the motor running, gently depress the front of the shroud. The following three things should happen.
 - The audible alert will sound momentarily.
 - The red indicator light on the top of the Shaker will illuminate.
 - The solenoid should audibly engage the tube clamp.
2. If the latter alone fails to occur, or if the motion of the clamp seems sluggish, it is possible that the solenoid is providing insufficient force to properly clamp the tubing. This failure may be due to one of several possible causes. To locate the problem, it will be necessary to remove the clamp body from the neck of the Shaker to obtain access to the involved parts.

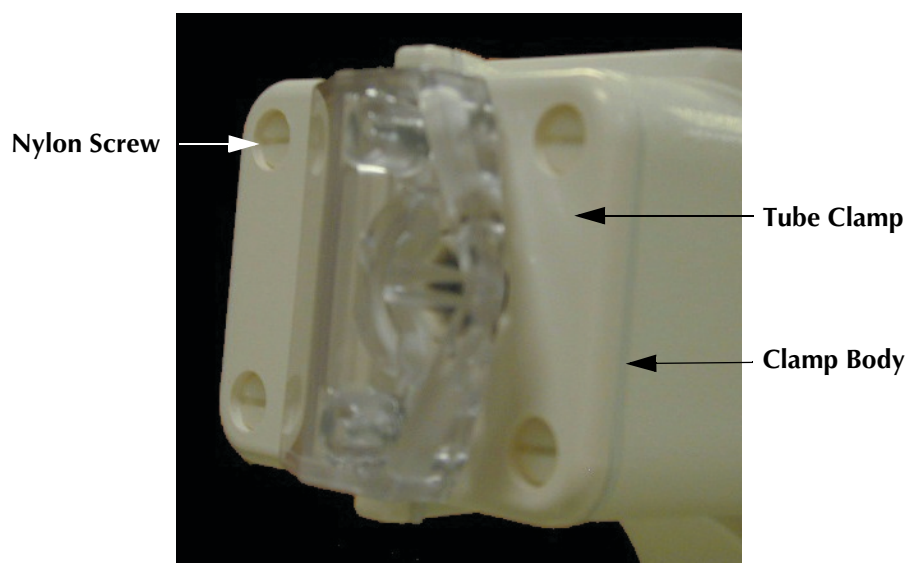


Figure 7-1, Close-up of Tube Holder and Clamp Body

3. Unplug the power cord from the outlet. Remove the four nylon screws from the clamp body.
4. Gently pull the clamp body (with the solenoid assembly attached) out of the neck of the Shaker. Gently remove the gasket by pulling it off over the clamp body and save the gasket for reinstallation of the clamp body. Allow the clamp body/solenoid assembly to rest on the shroud of the Shaker.
5. Disconnect the Shaker wiring harness and the solenoid wiring connection.
6. Inspect the tube holder for security and cracks.
7. Verify that the solenoid has not come loose from the clamp body. If it has, use the self-tapping screw to replace.
8. While holding the clamp body in a downward position, push in on the back of the solenoid plunger. The plunger should move in and out freely. Rotate the plunger 1/16th turn clockwise and repeat the motion. The plunger should move in and out freely. Repeat the process above at least 16 additional times. The plunger should move freely at each point it is tested. If the solenoid sticks or is sluggish at any point, slightly loosen the two screws that secure the solenoid to the clamp body to relieve binding. Tighten until snug, repeating the above test to verify its motion. This procedure may need to be repeated several times to achieve the desired affect.
9. Verify that the rubber gasket around the neck of the Shaker provides a good seal to prevent fluid from entering the Shaker body.
10. Remove the mounting screws that secure the solenoid to the clamp body. Update if necessary to the new, self-tapping screws. Grease when reassembled. Verify the tube clamp has not worked loose from the solenoid shaft. Remove tube clamp from solenoid shaft to inspect and clean.
11. Verify solder joints on solenoid are intact. Set aside solenoid shaft. Remove two Phillips head screws that secure tube holder to clamp body. Update to the self-tapping threads (a large hole must be drilled).
12. Clean the surfaces of the Shaker using a soft cloth dampened with a mild detergent, diluted disinfectant, or alcohol. Never spray solutions directly onto the Shaker, but spray on a damp cloth and wipe surface clean. Bleach solutions are extremely caustic and can damage a variety of materials. Full strength bleach should never be used on the Shaker. If bleach or bleach solutions are used, it is recommended that bleach be diluted per user standard operating procedures. The Shaker must then be wiped down with a damp cloth to remove any bleach residue.
13. Inspect clamp body for cracks. If any are found, replace clamp holder.
14. Reinstall, tighten snug and verify tube holder is flat against the clamp body. Set aside.

15. Use light sand paper to remove build up on tube clamp. Assemble solenoid replacing the spacer. Remove residual super glue on shaft. Set the length of the tube clamp and shaft to $4.125 + 0.010 - 0.005$ in.
16. Push up on bottom of solenoid, hold spacer with thumb, tip solenoid upside down and apply super glue to the threads where the tube clamp meets the solenoid shaft. Do not allow super glue to run the opposite direction into the shaft of the solenoid. After glue seeps in between the threads, drop the spacer to glue it to the tube clamp.
17. Apply Dow Corning® 55 grease Molycoat to the O-ring and tube clamp with finger. Try to avoid greasing the face of the tube clamp.
18. Reassemble tube clamp by placing the nose of the solenoid into tube clamp and the tube clamp into tube holder with the wires facing the opening. Fasten with the self-tapping screws without a washer. Do not tighten completely until the other screw has been started. Adjust so it does not bind and moves freely in 360° .
19. Plug in the Shaker and place a blood bag set containing water on the bag tray, with tubing threaded in the tube clamp. Press the <-> button to energize the solenoid and force an air bubble through the tubing. No movement of air bubble through the tube clamp should be observed. Unplug the Shaker.

TUBE CLAMP INSPECTION AND ADJUSTMENT

Reference Solenoid Assembly 10406000.

1. Remove the two self-tapping screws that hold the solenoid to the clamp body. Remove solenoid and tube clamp from clamp body.
2. Inspect clamp body and tube holder for cracks; replace if necessary.
3. The tube clamp should be tight on the solenoid shaft.
4. If replacement or adjustment of the tube clamp is required, break the tube clamp from the solenoid shaft.
5. Verify that the solenoid shaft is not bent or causing the tube clamp to bind in the clamp body.
6. Replace/adjust the tube clamp on the shaft to a length of $4.125 + 0.010 - 0.005$ in. Apply a drop of Super Glue to where the shaft and clamp meet; allow the spacer to drop onto the clamp. Allow adhesive to set.
7. To reassemble, apply Dow Corning® 55 lubricant to the O-ring and tube clamp. Do not allow lubricant on the top of the clamp where it contacts the tube holder.
8. Reassemble, reference Tube Clamp/Solenoid Inspection, Replacement and Adjustment on page 7-2.
9. Power on the Shaker. Using a water bag, thread the tubing through the tube clamp. Activate the clamp by pressing the <-> key. Attempt to force a bubble through the clamp. No movement through the clamp should be noticed.

Chapter 8

PCB Chassis Assembly Installation

INSTALLING THE PCB CHASSIS ASSEMBLY	8-2
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INSTALLING THE PCB CHASSIS ASSEMBLY



Caution: *Always wear an ESD strap when working on the Shaker.*



Note: *Models with serial number 0535 or greater are manufactured with an interboard connector in place of the power supply to body board cable (P/N 10403300).*

1. Connect the extension harness (P/N 10405012-00) between the base and PCB chassis assembly, as follows:
M = Motor connector, P3 on the Power Supply Board
SG = Strain Gauge Connector P2 on the Body Board
E = Reed Switch Connector, P3 on the Body Board
S = "Sonalert" Audio Alert Connector, P7 on the Body Board.
2. Set the Shaker on its feet with the chassis assembly out of the base.
3. Place AC ground wire directly from the input power receptacle onto the chassis ground and secure with lock washer and nut.
4. Connect Power Harness to P2 on the Power Supply Board.
5. Connect head to body PCBA cable assembly to P1 on body board.



Warning: *With the removal of the Body Board and Power Supply PCBA's from the base, AC and DC voltages are exposed. Use CAUTION when handling these assemblies.*



Warning: *Input Power fuse "F1" fuse holder, located on the power supply PCBA, is exposed when the Body Board and Power Supply PCBA's are removed from the base. Use CAUTION when handling these assemblies.*



Caution: *Ensure disconnected ground wires are controlled to prevent contact with internal components.*

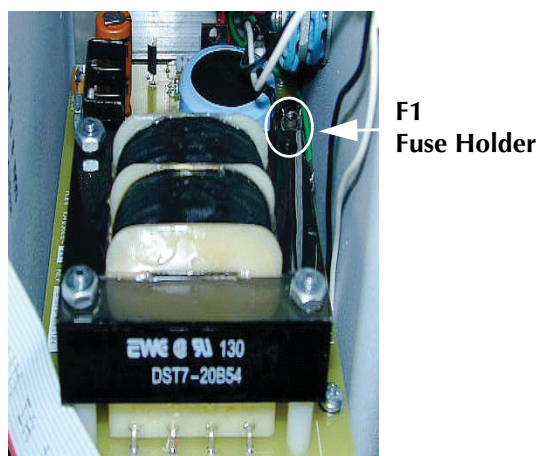


Figure 8-1, Fuse Holder

6. Apply power to the Shaker, turn on and observe that Shaker display shows VER HB01,BB V.92, then <READY>.
7. Press <*> to cycle shroud assembly and count the cycles for one minute (cpm). If power supply p/n 10403200 is installed, adjust potentiometer RV1 on Power Supply Board to obtain 38 cpm ± 5 cycles. If PCBA 10403600-XX, Revision A or later is installed, RV1 is no longer used. Resistor R6 controls the cpm.
8. Perform Spring Tension Adjustment procedures (see Chapter 6, Spring Tension Adjustment on page 6-5) and Body Board Strain Gage Amp calibration procedures (see Chapter 5, Body Board Strain Gauge Amp Adjustment Procedure on page 5-7).
9. Verify software settings (see Chapter 9, Program setting "F1" on page 9-3).
10. Disconnect extension harness and reinstall PCB Chassis Assembly and base plate.



Warning: Ensure base plate ground wire is attached to base plate.

Chapter 9

Microprocessor

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BODY BOARD REPLACEMENT



Warning: With the removal of the Body Board and Power Supply PCBA's from the base, AC and DC voltages are exposed, use CAUTION when handling these assemblies.



Caution: Always wear an ESD strap when working on the Shaker.

1. Remove body board and power supply from the base of the Shaker (see Chapter 5, Body Board Strain Gauge Amp Adjustment Procedure on page 5-7).
2. Disconnect all plug connectors from Body Board.
3. Remove the four mounting screws and install the new Body Board.
4. Attach the extender harness.
5. Apply power to Shaker. Adjust R3 and R7 (see Chapter 5, Body Board Strain Gauge Amp Adjustment Procedure on page 5-7).
6. Verify all settings (see below).
7. After installing a new body board, the unit must be programmed using the instructions in Program setting "F1" on page 9-3 and Clock/Calendar Initialization on page 9-7.

PROGRAM SETTING "F1"

1. Ensure that the Shaker is powered "on." Press <#> then <1>. The display will read "pw." Enter default password by pressing <-> six times.
2. Press <0>, then <*> thirteen times. The display will read "f1: 02."
3. Press <+> twice. The display will read "f1: 04." Program step "f1" is now set.

CHANGING THE DEFAULT COLLECTION WEIGHT PARAMETER



Warning: Changes made to some parameters in this portion of the program can affect the accuracy and performance of the Shaker. Ensure that these instructions are followed when changing a default value, and do not enter other portions of the program. Please contact Haemonetics with any problems or questions.

Reference Bag Codes on page 9-9 for codes and default targets.

It is recommended that verification is performed following the change of default weights. Verification determines if the total collection weight/volume is within the blood center's acceptance range. Use saline filled bags to perform verification.

- Collecting in Grams — If you are collecting in grams you must calculate the total collection weight.
- Formula: *Total collection weight = (Average collection bag weight with CPD) + (net amount of blood)*
- Collecting in Mls — Know the total blood volume to be collected. The shaker will automatically tare the weight of the bag prior to starting collection.

Determine which bag code (bag #) the center will use. Verify or change the default bag code by following the setup instructions within the 1040 Operation Manual.

After the collection weight is determined and the bag code is known, use the following procedure to change the required default collection weight:

1. Turn power on by plugging Shaker into the outlet. The LED display will show "ready".
2. Press <1>. The display will read "pw". Press the minus sign <-> six times.
3. Press <0> twice. The display will read "manual".
4. Press <*>. The display will read "bag data".
5. Press <+>. The display will read "0A:00585".
6. Pressing <*> will cycle through the 10 bag codes (0A, 0B, 0C, 1A etc) and display the current default values. Each bag code has three parameters (values) associated with it. The sequence is as follows:
 - The first digit, "0", "1" through "9", represents the Bag Code number.
 - The second digit, "A" or "B" represents the mode of collection for that bag code and "C" represents the scale factor, as follows:

A = Grams (gm) — This should be the average bag weight with solution plus the whole blood target

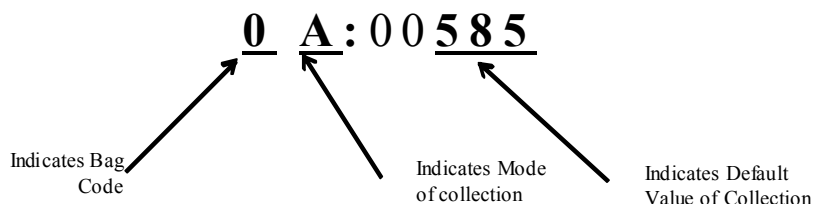
B = Milliliters (ml) — Does not include bag weight

C = Scale Factor (maintains accuracy)



Warning: Do not change the scale factor (the "C" value) without contacting Haemonetics. Shaker accuracy will be affected.

- The last three digits represent the value of that parameter (e.g., 0A:00585 represents a default collection for Bag 0 in grams, for 585 gms). See the following example:



7. Use the <1> and <0> keys to position the flashing digit left or right. Press the <+> or <-> to increase or decrease to the desired default collection value. Weight adjustment range is from 250 to 700 grams.
8. Press <#> twice to return to "ready".
9. Calibrate the Blood Shaker and observe the next blood collection. The Shaker will complete a "Full Bag" collection and activate the tube clamp at the new default collection value. If the collection value does not reflect the desired default change, contact Haemonetics for assistance.

PROGRAM BAG CODE SCALE FACTORS

Program setting "Bag Code 0" scale factor

1. Press <*> three times. The display will read "bag data".
2. Press <+> then <*> twice. Display will read "OC:00280".
3. Press <-> ten times. The display will read "OC:00270". Bag Code 0 is now set.

Program setting "Bag Code 3" scale factor

1. Press <*> nine times. The display will read "3C:00280".
2. Press <-> four times. The display will read "3C:00276". Bag code 3 is now set.

Program setting "Bag Code 4" scale factor

1. Press <*> three times. The display will read "4C:00280".
2. Press <-> seventeen times. The display will read "4C:00263". Bag Code 4 is now set.

Program setting "Bag Code 5" scale factor

1. Press <*> three times. The display will read "5C:00280".
2. Press <-> fourteen times. The display will read "5C:00266". Bag Code 5 is now set.

Program setting "Bag Code 6" scale factor

1. Press <*> three times. The display will read "6C:00310".
2. Press <-> ten times. The display will read "6C:00300". Bag Code 6 is now set.

Program setting "Bag Code 8" scale factor

1. Press <*> six times. The display will read "8C:00280".
2. Press <-> ten times. The display will read "8C:00270". Bag Code 8 is now set.
3. Press <#> twice to return to "READY".

CLOCK/CALENDAR INITIALIZATION

1. Press <1>. Enter default password and press <*>.
2. Press <+>. Display will read "24 hour."
3. Press <*>. Press <+> or <-> to set the hour.
4. Repeat step 3 to set the minutes, year, month and day.
5. Press <#> to return to "READY."

MICROPROCESSOR SETTINGS

Microprocessor default settings

Full
Unit: gm
Bag # 0
Time and Date

Microprocessor program settings

Den 1055
f1 04
f2 07

BAG CODES

0A: 00585	0B: 00450	0C: 00270
1A: 00585	1B: 00450	1C: 00280
2A: 00325	2B: 00250	2C: 00250
3A: 00585	3B: 00450	3C: 00276
4A: 00585	4B: 00450	4C: 00263
5A: 00585	5B: 00450	5C: 00266
6A: 00585	6B: 00450	6C: 00300
7A: 00446	7B: 00350	7C: 00258
8A: 00585	8B: 00450	8C: 00270
9A: 00585	9B: 00450	9C: 00280



Warning: These settings can be different from what is listed, depending on your blood center requirements and Shaker performance. Contact Haemonetics® Customer Care Center if you have any questions.

BAG COMBINATIONS AND TYPES

There are several types and sizes of blood bags. The Shaker needs to be configured for the primary blood bag being used. The following table gives the default bag codes.



Note: Contact Haemonetics to further consult about the correct bag code for your blood collection use.

Table 9-1, Blood Bag Codes

CODE	BAG DESCRIPTION
0	Fenwal® 450 & 500 ml ^a .
1	-----
2	Fenwal 250ml
3	Pall® 450ml & 500ml ^a , US
4	Pall 450ml, Héma Québec
5	Terumo® 450ml & 500ml ^a .
6	Fenwal 450/800ml ^a .
7	Kawasumi® 350ml
8	Pall 450ml, Canadian
9	-----

^aBag volume/weight may need to be changed depending on which bag is used.

Chapter 10

Shroud and Base Assemblies

SHROUD AND BASE INSPECTION	10-2
SHROUD BOSS FAILURE	10-3
MOTOR REPLACEMENT	10-4
BAG PIN REMOVAL	10-5
BAG PIN INSTALLATION	10-6
BOWING THE SHROUD	10-7
SHROUD ASSEMBLY INSTALLATION	10-8

SHROUD AND BASE INSPECTION



Caution: *Always wear an ESD strap when working on the Shaker.*

The shroud is the portion of the Shaker including the bag tray and bag pins which actively moves when the Shaker is in operation. It provides a platform on which to mount and secure the bag during weighing as well as providing a "shroud" over the inner workings of the Shaker to prevent unwanted dust and dirt from entering the mechanical portions of the Shaker.

1. Examine the overall appearance of the shroud. It should be free of any cracks, gouges, or missing pieces of plastic. The shroud bosses should be secure and should show no evidence of previous repair. The shroud should be replaced if the shroud boss is severely damaged, loose, or broken off of the inside of the shroud completely. The old bag pins and their mounting hardware may be retained and reinstalled in the new shroud if not worn or damaged.
2. Inspect the bag pins on the front of the shroud for tightness by attempting to further tighten the screws while holding the pins with soft-jawed pliers or a similar device. Check the spacing of the pins by placing a Haemonetics certified calibration weight over the pins. The pins can be adjusted by loosening the screws, resetting the pins to the proper spacing, and tightening the screws while holding the pins with soft-jawed pliers.

SHROUD BOSS FAILURE

1. A shroud boss failure is almost always caused by rough handling including improper methods of lifting and carrying, packaging for shipment, and transporting to and from donor areas.
2. If the front of the shroud can be lifted without lifting the rest of the Shaker and the shroud boss is still attached to the link assembly, then the shroud boss has broken loose from the shroud and the entire shroud must be replaced (see Bowing the Shroud on page 10-7 and Shroud Assembly Installation on page 10-8).

MOTOR REPLACEMENT



Note: Motor Assemblies P/N 10402300 and P/N 10402405-0001 are no longer in use. When replacing, use Motor Assembly P/N 10401300-00 (Motor P/N 10401301-00 and 10402407). See Caution below.



Caution: *The new motor is incompatible with the old power supply PCBAs, P/N 10403200. Power supply P/N 10403600 must be in place when replacing an old motor. See Chapter 14, Power Supply Replacement on page 14-2.*

1. Motor failure is indicated when the shroud will not rock, yet the LED illuminates and comes to the "READY" mode.

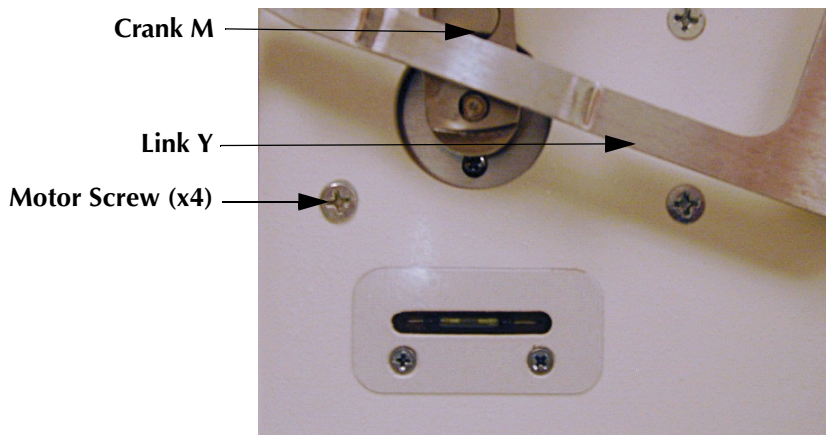


Figure 10-1, Location of Motor Screws (Fourth Screw Obscured by Link Y)

2. To replace the motor subassembly, remove base plate (Chapter 4, Base Plate Removal on page 4-2) and shroud (Shroud Removal on page 4-3). Remove Body Board and Power Supply Assemblies (Chapter 5, Strain Gauge Inspection and Replacement on page 5-2 and Body Board Strain Gauge Amp Adjustment Procedure on page 5-7). Remove Link Assembly (Chapter 6, Link Assembly Removal on page 6-3) Remove Crank M from the motor shaft by removing the hex bolt screw. Remove the four screws that secure the motor assembly to the base assembly.
3. Reverse disassembly procedures to install new motor assembly.

BAG PIN REMOVAL

The bag pins are the two 0.50 x 0.305 in. cylindrical stubs on the top front of the shroud. They secure the blood bag and/or certified calibration weight in the proper position for high accuracy dynamic weight measurement. Damage requiring replacement of the bag pins is extremely rare, and is usually the result of cleaning with improper chemicals.

The pins may be removed by holding the exposed top portion of the pin with a pair of soft jawed pliers, while unscrewing the 1/4 in. 20 x 0.38 in. pan head phillips screw from the inside of the Shaker. Retain all mounting hardware (the screws and washers or backing plate) to install a new pin in this shroud, or to reinstall the old pin in a new shroud.

BAG PIN INSTALLATION

1. Align one pin over each hole from the outside of the shroud. Depending on the hardware ordered or provided with the Shaker, place the backing plate or ¼ in. -20 x 0.38 in. pan head phillips screw through the washer or plate and shroud into the pin. Partially tighten the screw into the pin. Repeat this process for the remaining pin.
2. To obtain the correct pin spacing, position a Haemonetics certified calibration weight over the pins and adjust the spacing while tightening the screws into the pins. When the proper spacing has been obtained, securely tighten the screws in place.

BOWING THE SHROUD

Shrouds shipped from the manufacturer may arrive with the sides slightly bowed in from the pressure of packing material. Although this is not a permanent condition, it should be corrected prior to installing the link assembly or the link assembly may rub against the inside of the shroud and cause the Shaker to collect overweight units of blood.

1. Partially assemble the shroud by installing the bag pins, as described in the previous section.
2. Place the shroud in a sink or wash tub with the opening facing up. Insert a 2 x 4 x 5.50 in. wooden block, padded on each end with 1 x 2 x 5 in. foam pads, immediately behind and parallel to the front boss and wedge it firmly in place.
3. Fill the shroud with hot water 140° to 160° F (60° to 71° C) and allow the shroud to soak for one hour. Pour off the water, leaving the block in place, and allow the shroud to cool for at least 30 minutes.
4. Remove the block and foam pads.
5. Dry the shroud and prepare to install the link assembly.

SHROUD ASSEMBLY INSTALLATION

1. To assemble the shroud assembly to the base, rotate the link assembly until the Link D is in its highest position.
2. Lay the Shaker in a cradle with the bottom of the Shaker facing up.
3. Loosen the screws on the rear boss inside the shroud and slide it onto the link until the shaft in the Link D slides into the grooves in the rear boss of the shroud and behind the cone screw/washers. Using a long screwdriver, tighten the rear boss screws.
4. Apply a small amount of grease in the center of the female knife.
5. Position the female knife over the knife edge.
6. Place screws into the holes on each end of the female knife.
7. Bring the shroud up to the female knife, aligning screws with boss.
8. Through the bottom of the base, hold one screw in place with a long philips screwdriver and start the screw.
9. After beginning one screw, start on the other one and then tighten both.

Chapter 11

Clamp Body Boss Replacement

REPLACING THE BODY BOSS	11-2
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REPLACING THE BODY BOSS



Warning: Only minor cosmetic repairs to the base are recommended.



Caution: Always wear an ESD strap when working on the Shaker.

The clamp body bosses hold the clamp body in the neck of the Shaker. If the Shaker sustains a blow or is dropped, one or more of the bosses may break free.

The clamp body bosses should be retained on the screws holding the clamp body. Once located, they may be reattached to the Shaker using Loctite® 3412.



Warning: Read and observe all safety information and precautions on the labels of the adhesives and accelerators prior to use.

If all four of the clamp body bosses have been broken, return Shaker to Haemonetics, or use as scrap.

1. The clamp body bosses can be positioned by using the clamp body as a jig. If only one of the clamp body bosses has been broken, the correct placement for its reinstallation can be determined by screwing the clamp body boss to the clamp body and installing the clamp body into the neck of the Shaker.



Note: The screw holes in the clamp body bosses are concentric and the thickest portion typically rests in the corner of the neck of the Shaker.

2. Verify that the clamp body boss is rotated so that it is securely positioned in the corner of the neck, and that all of the other clamp body boss screw holes are aligned with their respective holes in the clamp body.
3. Remove the clamp body and mark the position of the clamp body boss. Remove the screw holding the clamp body boss in place. Remove any old adhesive from the outside of the clamp body boss and the inside of the neck of the Shaker with 220 grit sandpaper.
4. Apply a small amount of Dow Corning® 55 to a Q-tip®. Lightly coat all surfaces of the clamp body in the vicinity of the clamp body boss to be glued. The lubricant will act as a release agent in the event that some of the adhesive should come in contact with the clamp body.
5. Apply a small amount of Dow Corning 55 to the other end of the clamp body boss and the exposed edge of the Shaker neck, using care not to apply lubricant on the sides of the clamp body boss, as the adhesive will not bond properly to any area to which the Dow Corning is applied. Attach the clamp body boss to the clamp body and align it with the mark made earlier.



Warning: Wear protective gloves and eye protection when using chemicals or adhesives, and dispose of all waste materials in properly marked containers.



Warning: Read and observe all safety information and precautions on the labels of the adhesives and accelerators prior to use in the following procedures.

6. Apply Loctite® 3412 adhesive to the inside of the Shaker in the area the clamp body boss is to be installed, and to the outside of the clamp body boss in the area of attachment without allowing adhesive to collect in the area between the clamp body boss and clamp body.
7. Position boss in its proper location, noting the location of its screw hole in relation to the other bosses.
8. Install and tighten the remaining screws to hold the clamp body in place until the adhesive is dry (10 minutes minimum).
9. Remove the screws holding the clamp body in place and clean all of the Dow Corning® 55 from the clamp body and Shaker neck using Q-tips® and paper towels moistened with alcohol. Dispose of all cleaning materials in properly marked containers.



Caution: Failure to remove all of the Dow Corning 55 may result in a discoloration of the clamp body or Shaker neck.

10. Reinstall the clamp body in the Shaker neck.

Chapter 12

Audible Alert Replacement

AUDIBLE ALERT FAILURE	12-2
AUDIBLE ALERT REMOVAL	12-3
AUDIBLE ALERT INSTALLATION	12-4

AUDIBLE ALERT FAILURE



Caution: *Always wear an ESD strap when working on the Shaker.*

If the tube clamp mechanism and flow rate indicator lights function properly, but the audible tone does not sound to signal clamping, the audio alert may have failed and the audible alert assembly requires replacement.

AUDIBLE ALERT REMOVAL

1. Remove Base Plate (see Chapter 4, Base Plate Removal on page 4-2) and Shroud (see Chapter 4, Shroud Removal on page 4-3).
2. Remove Body Board and Power Supply Assemblies (see Chapter 5, Body Board Strain Gauge Amp Adjustment Procedure on page 5-7, and Chapter 14, Power Supply Replacement on page 14-2).
3. Remove the audible alert from the Shaker base by detaching the plastic retaining nut.

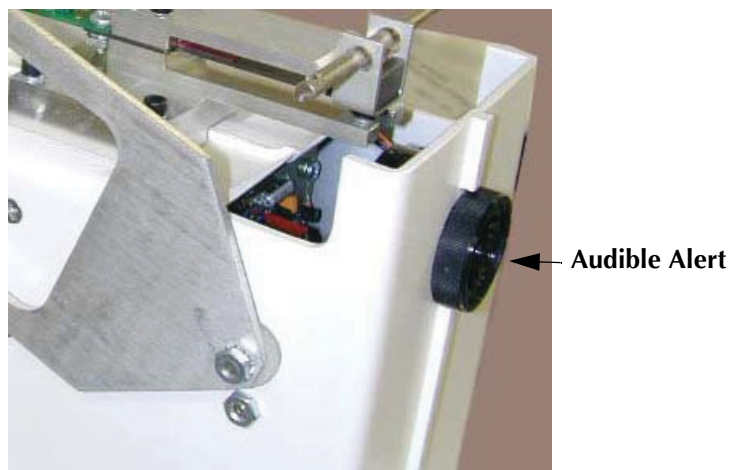


Figure 12-1, External View of Audible Alert

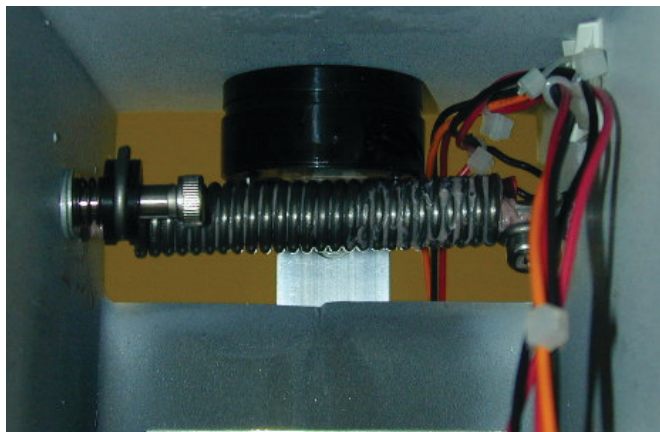


Figure 12-2, View of Audible Alert from Inside the Shaker

AUDIBLE ALERT INSTALLATION

1. Insert the Audible Alert Assembly into the base of the Shaker, securing the plastic retaining nut.
2. Connect the cable of the new Audible Alert Assembly (P/N 10402100) to P7 on the Body Board of the PCB chassis assembly.
3. Reverse removal procedures for installing the Shroud, Body Board/Power Supply Assemblies and Base Plate.

Chapter 13

Cap Assembly

CAP ASSEMBLY INFORMATION	13-2
CAP ASSEMBLY REMOVAL	13-3
INDICATOR LIGHT REPLACEMENT	13-4
HEAD BOARD REPLACEMENT	13-5
KEYPAD REPLACEMENT	13-6
CAP ASSEMBLY INSTALLATION	13-7

CAP ASSEMBLY INFORMATION



Caution: *Always wear an ESD strap when working on the Shaker.*

The cap assembly provides access to the head board, LEDs for indicator lights and display, solenoid and keypad.

CAP ASSEMBLY REMOVAL



Note: This applies to Shakers built before January 2005.

1. Follow the instructions in Chapter 4, Base Plate Removal on page 4-2, for removing the base plate.



Figure 13-1, Cap Assembly

2. Disconnect the ribbon cable from the body board connector.
3. Remove the two phillips head screws on either side of the satellite bag peg.
4. To remove the Keypad/Faceplate, slide a razor blade or Exacto knife under the plate, being careful not to gouge the plate. Gently peel the face plate partially up from the left to the right. When the face plate is approximately two-thirds removed, the keypad will be exposed. Place a finger on the keypad to hold it in place while removing the remainder of the face plate. For Shakers manufactured after 11/00, the face plate and keypad are one assembly.



Caution: *Only peel faceplate from left to right or keypad may be ripped. Do not re-use the keypad.*

5. Remove the four phillips head screws beneath the face plate.



Note: To remove the lower left hold-down screw, gently lift the corner of the keypad away for access.

6. Unplug the solenoid connector and pull the ribbon cable through the gooseneck.

INDICATOR LIGHT REPLACEMENT

Pull head board out of cap assembly by removing the four mounting screws, using care when handling keypad.

HEAD BOARD REPLACEMENT

1. Pull head board out of cap assembly by removing the four mounting screws, using care when handling keypad.
2. Unplug the connectors attached to the head board. Replace head board, plugging the connectors into the new board.
3. Reinstall head board into cap assembly.

KEYPAD REPLACEMENT

1. Pull head board out of cap assembly by removing the four mounting screws.
2. Unplug the keypad from the head board.
3. Peel up the old keypad, ensuring that the residual adhesive is removed from the face of the cap.
4. Peel the backing off of a new keypad and center it on the cap. Thread the keypad connector through the slot and plug it into the head board.



Caution: *Do not attempt to adjust keypad once it has been placed or the tactile dome will be damaged and a new keypad will be required.*

CAP ASSEMBLY INSTALLATION

1. Thread ribbon cable through goose neck. Connect Solenoid connector.
2. Inspect gasket for gum or tears, if necessary.
3. Remove residual adhesive from cap by gently rolling it off with a finger.
4. Peel backing off of new face plate assembly and install.

Chapter 14

Power Supply

POWER SUPPLY REPLACEMENT	14-2
Power supply inspection	14-2
Power supply replacement	14-2

POWER SUPPLY REPLACEMENT



Caution: Always wear an ESD strap when working on the Shaker.



Warning: The Input Power fuse "F1" fuse holder, located on the power supply PCBA, is exposed when the Body Board and Power Supply PCBA's are removed from the base. Use CAUTION when handling this assembly.



Note: Schematics are needed for this operation.

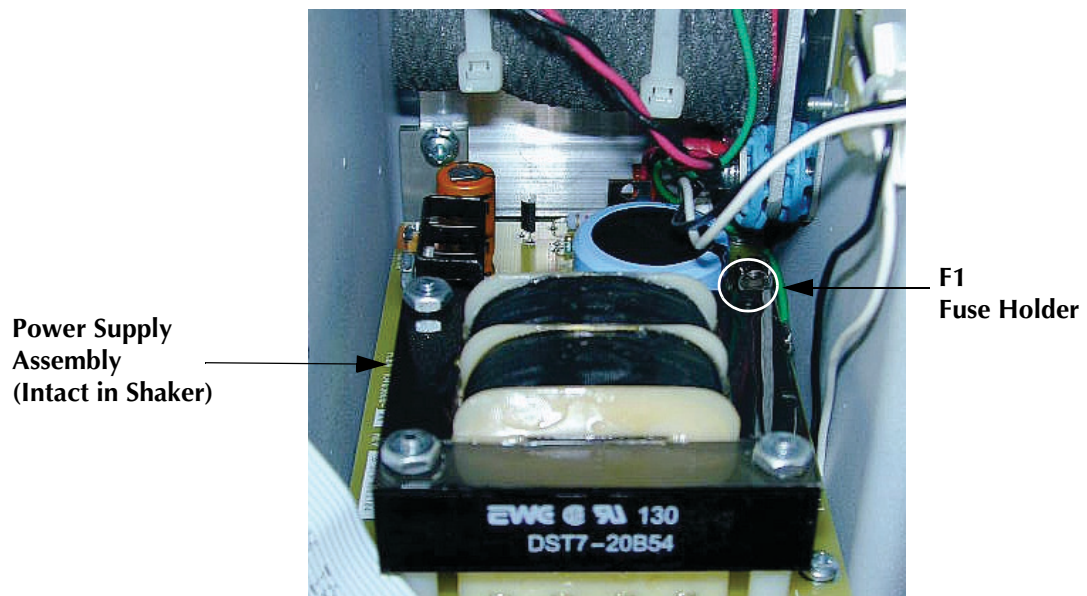


Figure 14-1, Location of Fuse Holder

Power supply inspection

1. Remove base plate (see Chapter 4, Base Plate Removal on page 4-2).
2. Check the P1 connector for proper voltages. If no voltage is present, check F1. If F1 is good, replace the power supply.

Power supply replacement



Note: Power supply P/N 10403200-xx and P/N 10402405-XXX are no longer in use. Contact Haemonetics to determine the appropriate replacement.

1. Disconnect all plug connectors from the power supply.
2. Unscrew the four mounting screws and install the new power supply with the same orientation.
3. Attach the extender harness. With the motor installed and the shroud mounted, start the Shaker rocking. Adjust RV1 so that the Shaker rocks at 38 rpm (± 5 rpm). In later versions, no adjustment is required, as RV1 is replaced with a fixed resistor (R6).
4. Remove extender harness and reattach all connector plugs. Reinstall chassis assembly and base plate.

Chapter 15

Shaker Keystroke Quick Reference

KEYSTROKE QUICK REFERENCE	15-2
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KEYSTROKE QUICK REFERENCE



Note: The operator should be familiar with the detailed Shaker communication instructions before using this reference guide.

Table 15-1, Keystroke Quick Reference

KEYSTROKE	POSSIBLE ACTION/USE
start/stop,<*>	Read operator input, if any, and proceed to next step. Start blood collection from ready mode. Enter into pause mode during collection. Terminate collection when in pause mode.
restart/return,<#>	Return to ready mode. Resume blood collection when in pause mode. Restart calibration after zero weight measurement.
↑, <+>	Increase a value. Toggle between choices. Password character. Start clock/calendar initialization from setup.
↓, <->	Decrease a value. Toggle between choices. Password character. Start configuration from setup. Clamps solenoid to verify function.
Psword, ← , <1>	Access to password for setup and calibration from ready mode. Move cursor to left.
review, →, <0>	Review last collection data from ready mode. Move cursor to the right.

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